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**Yaghi et al.**

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(54) **IMPLEMENTATION OF A STRATEGY FOR ACHIEVING EXTRAORDINARY LEVELS OF SURFACE AREA AND POROSITY IN CRYSTALS**

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(51) **Int. Cl.**

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**C07F 5/00** (2006.01)

**C07F 3/06** (2006.01)

(52) **U.S. Cl.** ..... **540/145**; 534/15; 556/43;  
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556/112; 556/113; 556/136; 556/141

(58) **Field of Classification Search** ..... 556/43,  
556/46, 51, 58, 72, 89, 112, 113, 136, 141,  
556/137; 534/15; 540/145  
See application file for complete search history.

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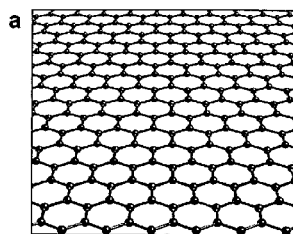
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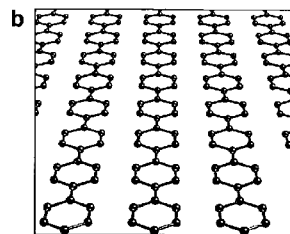
(57) **ABSTRACT**

The present invention provides a metal-organic framework (“MOF”) comprising a plurality of metal clusters and a plurality of multidentate linking ligands. Each metal of the plurality of metal clusters comprises one or more metal ions. Each ligand of the plurality of multidentate linking ligands connects adjacent metal clusters. The present invention also provides a method of forming the metal-organic framework. The method of the invention comprises combining a solution comprising one or metal ions with a multidentate linking ligand having a sufficient number of accessible sites for atomic or molecular adsorption that the surface area of the resulting metal-organic framework is greater than 2,900 m<sup>2</sup>/g.

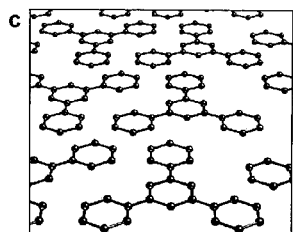
**28 Claims, 8 Drawing Sheets**



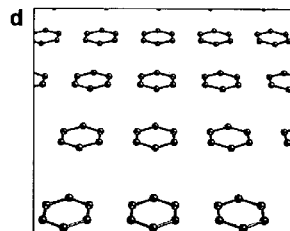
2,965 m<sup>2</sup>/g



5,683 m<sup>2</sup>/g



6,200 m<sup>2</sup>/g



7,745 m<sup>2</sup>/g